SEAT APPARATUS HAVING VARIABLE GAP

Technical Field

The present invention pertains to a seat apparatus having a variable gap and, more particularly, to a seat apparatus having a pair of divided seats so that the gap between the seats can be adjusted in order to adapt to the body shape of a user.

Background Art

When a person spends a long period of time on a chair, coccygodinia is likely to occur. Coccygodinia is a pain in the coccyx or tailbone at the end of the lumbar.

Also a person with hemorrhoids has difficulty in maintaining a posture for a long time while sitting.

The Korean Utility Model No. 20-0260631, "chair having separate seat" was previously submitted and registered as a device to relieve the pain from people with such symptoms.

In this Utility Model, the seat is designed in a way that a user can adjust the gap between a separated set of base units.

Although the gap is adjusted through a gear mechanism attached underneath the seat, this mechanism presents certain inconveniences.

The gap spacing is restricted and can be adjusted by

the first and the second fixation holes.

Therefore, the spacing can only be adjusted in steps making minute adjustment not possible.

The user must unlock and relock the mechanism after each adjustment of the space, and must rise from the chair to do that.

Disclosure of the Invention

The present invention was devised in an effort to improve the problems stated in the above section.

A main object of the present invention is to provide a seat apparatus having a convenient gap control to adjust and maintain the seat at a desired position while using. An another object of the present invention is to offer a comfortable seating with a soft cushion as well as air ventilation through the gap. The application of the invention can extend to the automobile seats.

To accomplish the above object, this invention provides A seat apparatus having a variable gap comprising: a pair of seats that can move in the opposite directions; a pair of moving plates each attached under the seats to move in the opposite directions; a base for supporting the moving plates so as to move in the opposite directions; a shaft rotatably attached on the upper side of the base; a cylindrical gap controller attached in the middle of the shaft having a pair of guidance grooves that have one narrow end and the

other wide end; driving means attached on one end of the shaft for rotating the shaft; a pair of connectors having the one ends coupled with the guidance grooves on the gap controller and the other ends fixed on the moving plates at the corresponding positions to the guidance grooves of the gap controller; and guiding means for making the moving plates move on the base in the axial direction, wherein gaps between the pair of the seats and the pair of moving plates coupled with the guidance grooves through a pair of connectors is adjusted by rotating the shaft clockwise/counterclockwise with the driving means.

The guiding means comprises a plurality of supporting blocks wherein their one ends are slidingly fixed underneath the above moving plates and the other ends are assembled to the above shaft.

Also, the guiding means comprises a pair of roller grooves formed parallel to the shaft over the mentioned base in order to coordinate a path of the movement with the alignment of the shaft, and a plurality of rollers attached underneath the moving plates to be inserted on and move along the above roller grooves.

The guiding means comprises rails formed in the front and rear of the above base, and a plurality of rollers that are fixed on the corresponding locations of the moving plate to move along the above rail.

In addition, this invention further comprises at least one seat located in the front and/or rear of the above base.

This invention further comprises hinge units located the pair of seats and outside each ends of the above moving plates to form hinge joints, and buffering means attached between the seats and the moving plates.

The buffering means comprises either a leaf spring or a coil spring.

This invention provides a pair of seats that can move independently in the opposite directions; a pair of moving plates attached beneath the above seats that can move independently in the opposite directions; a base supporting the above pair of moving plates to move independently in the opposite directions; two shafts installed on the upper side of the base that can rotate; two truncated cone shaped gap controllers with guidance grooves attached in the middle of the above shafts; two motoring devices attached at the one ends of the above shafts to rotate them; a pair of connectors with one ends assembled with the guidance grooves on the gap controllers and the other ends fixed on each moving plates at the positions corresponding to the locations of the guidance grooves on the gap controllers.

This invention also provides a seat apparatus with a variable gap that can be controlled by two guiding devices that guides the movement of the above two moving plates parallel to the shaft on the base.

The two guiding means comprises either a plurality of supporting blocks with its one ends attached to the shafts to slide and the upper section fixed to the above moving plates,

or a plurality of rollers attached beneath the moving plates that are inserted into the roller grooves formed parallel to the direction of the shaft on the upper surface of the base in order to maintain the line of movements corresponding to the direction of the shaft.

Brief Description of the Drawings

Fig. 1 is a perspective view of a chair made in accordance with the concepts of the present invention.

Figs. 2A to Fig. 2C are figures to illustrate the seats in the narrow configuration according to the present invention.

Figs. 3A to Fig. 3C are figures to illustrate the seats in the wide configuration according to the present invention.

Fig. 4 is an exploded perspective view to illustrate the structure of the seat according to the present invention.

Figs. 5 and 6 are plan views to illustrate another embodiment of the present invention.

Figs. 7A and 7B are a front view and a side view to illustrate further embodiment of the present invention.

Fig. 8 is a front view to illustrate yet further embodiment of the present invention.

Fig. 9 is a figure to illustrate the efficacy of the present invention.

Best Mode for Carrying out the Invention

Now, the preferred embodiment of the present invention will be described in detail with reference to the appended drawings.

As illustrated in Fig. 1, an example of a general chair with back 10 and base 50 is used to explain the embodiment of the seat apparatus having a variable gap according to this invention.

Therefore, the concept of this invention is also applicable to a chair with or without the above back 10, armrest 15 or any other parts depending on the purpose and environment.

As illustrated in the Figs. 2A to 2C and Figs. 3A to 3C, the chair in accordance with this invention has a seat unit 20 comprised of a pair of seats 21 that can move horizontally enabling a user to adjust the gap between the seats 21.

Referring to Fig. 4, the above pair of seats 21 is assembled on a pair of moving plates 24. To attach the seats, in the front and rear of the above moving plates 24, fixing plates 33 are molded on the moving plates to hold the seats by bolting through many holes on the fixing plates 33.

In the inner center of the moving plates 24, there are connectors 30 attaching to a pair of guidance grooves 27a on the gap controller 27.

In addition, underneath the moving plates 24, there is a pair of supporting plates 31 attached in the front and the rear.

On each outer side of the supporting plate, there are two rollers 32 attached, which are inserted into and moving along a pair of roller grooves 23b that elongate sideways in the inner side of the base 23.

The rollers 32 support the moving plates 24 and prevent their bending into the base 23 during the movement, in addition to guiding the linear movement of the pates along the roller grooves 23b.

The structure of the moving plates 24 assembled with the base 23 through the supporting plate 31 and the roller 32 creates an open space. To prevent the foreign substances entering into the assembly, a first plate 24a blocks the front and the rear, and a second plate 24b blocks the side.

The base 23 enables the linear movement of the moving plates 24 in both ways. In the front and the rear of the base, there are a third plate 23a isolating the space within the assembly with the first plate 24a and the covering plate 34 is attached on the middle of the base to block the opening created when moving plates 24 are widened.

In the middle of the base 23, a pair of shaft supports 29 is installed at each edge of the base. The shaft support enables the rotation of the shaft 26.

In the middle of the shaft 26, the connector is assembled to the gap controller 27 through the guidance groove 27a. The gap controller is shaped cylindrically with the narrow front and the wider back.

Therefore, the width of the guidance groove 27a on the

gap controller 27 is also in a way that the front is narrow and the back is wide.

And the gap controller 27 is fixed and assembled on the shaft 26 through the extender 27b forming a concentric circle with the shaft in the middle as illustrated in Figs. 2C and 3C.

Many supporting blocks 28, two on each plate in this example, that can slide are attached on the shaft 26 to give a support to the center of the moving plate 24 and guide the linear movement by sliding along the shaft 26. For that reason, the height of the supporting blocks 28 needs to be equal to the height of the inner side of the moving plate 24.

With the connectors 30 on the moving plates 24 assembled on the guidance grooves 27a of the gap controller 27, the shaft 26 and the gap controller 27 rotate together when the lever 25 is pulled up. Therefore, the gap width of the connectors 30 assembled on the guidance grooves 27a change with the rotational angle of the gap controller 27.

When the connector 30 is at the narrow end of the guidance groove 27a on the gap controller 27, the width of the gap between the seats is the shortest. Therefore, the moving plates 24 are at the closest position and the seats 21 are adherent to each other (Refer to Figs. 2A to 2C).

On the other hand, when the connector 30 is at the wide end of the guidance groove 27a, the width of the gap is the longest and the gap between the seat is at its maximum (Refer to Figs. 3A to 3C).

Therefore, the user can adjust the lever 25 to rotate the shaft 26 to adjust the gap between the seats 21 and leave the lever 25 to maintain the gap between the seats 21.

Although a lever 25 was used as driving means to rotate the shaft 26 in this example, a reversible electronic motor can be used as well.

In this example, the gap control through the guidance groove 27a on the gap controller 27 is from 0 to 25 mm on each side (0 to 50 mm in total), but the gap can be set to be controlled in a longer or shorter range.

The assembling procedure of this invention is explained with reference to Fig. 4.

After mounting the supporting blocks 28 on the shaft 26, the shaft is rotatably fixed on the center of the upper side of the base 23 using a shaft support 29. Here, a lever 25 is attached at one end of the shaft 26.

After inserting the connector 30 fixed in the inner center of the moving plates 24 into the guidance groove 27a on the gap controller 27, the upper side of the supporting blocks 28 on the moving plates 24 is fixed by bolting through the holes.

When the moving plate 24 is assembled as the above, roller 32 is inserted in the roller groove 23b as illustrated in Figs. 2C or 3C.

With the moving plates 24 assembled on the base 23, the covering plate 34 is fixed by bolt on the front and back of the base 23.

The seats 21 are attached on the fixing plates 33 of the moving plates 24 by bolting.

After finishing the above assembly, attach the upper section of the base wheels 50 in the middle of the bottom of the base 23, attach the lower section of the armrest 23, and attach the lower section of the back 10 at the back of the base 23. When assembling the armrests 15 on the base 23, a proper distance for the movement of the moving plates 15 must be allowed.

The above embodiment of the invention used a general chair as an example. However, some of the components such as the back 10, the base wheels 50, and the armrest 15 can be excluded and the seat unit 20 can comprise the seat for automobiles with the back designed for automobiles.

That is, to apply the seat unit 20 for the automobile seats, a separate locking mechanism to slide the seat unit 20 along the seat rail on the automobile can be attached under the base 20.

In addition, it is possible to install the ventilation unit and the ventilation duct in the middle of the seats 21 after removing the covering plate 34 to provide a comfortable driving environment.

Although the above embodiment of the invention used the seats separated in two, it is possible to construct a seat base of four separate seats as shown in Fig. 5 and have each pairs 21a and 21b controlled by separate gap controllers.

For the above configuration, two sets of components

including moving plates, supporting plates, rollers, shafts, levers, gap controllers, supporting blocks, and roller grooves are necessary to match with a pair of seats 21a and 21b as in the example illustrated in Figs. 1 to 4.

Moreover, it is also possible to place an anterior seat 21d and a posterior seat 21e in addition to the pair of seats 21c as shown in Fig. 6.

In the example of Fig. 6, it is not necessary to move the anterior seat 21d and the posterior seat 21e at the same time. Therefore, each seat has independent moving mechanism.

An adequate moving means is to adopt a sliding mechanism to move the moving plate with the anterior seat 21d and the posterior seat 21e attached over the base.

To construct a seat as in the Fig. 6, a structure for moving the base back and forth in addition to the mechanism for horizontal movement is necessary.

When the anterior seat 21d and the posterior seat 21e are not to move, it is sufficient to provide brackets to hold the seats in the front and the back of the base.

Descriptions for the examples in Fig. 1 or Fig. 6 are carried out for the seat unit with two or four seats on the moving plates.

In addition to the examples, this invention also includes the mechanism to provide a shock absorb on the seats 90 against the moving plates 75as shown in Figs. 7 and 8.

In this example, sliding method of the moving plates 75 on the base 70 is also different. The concept of the invention

is explained with the illustrations on Figs. 7 and 8.

As the previous examples, the base 70 is attached on the base wheels 50 as shown in Fig. 1.

Rails 71 are formed on the front and the back of the base 70 and are bended perpendicularly.

As in the previous examples of embodiment (Figs. 1 to 6), a plurality of shaft supports are formed in the middle and the shaft 80 is installed on the shaft supports 72.

In the middle of the shaft 80, a gap controller 81 that moves the seat 90 horizontally is installed. The gap controller 81 has the same structure as the gap controller 27 described in the previous examples (Figs. 1 to 6).

A pair of moving plates 75 is attached on the base 70, and a pair of rollers 74 is installed inside each moving plate 75 in the front and the back.

The rollers can rotate and moves along the rails 71 formed in the front and the back of the base 70.

At the upper side of the gap controller 81 where two moving plates 75 are facing each other, a connector 76 inserted in the guidance groove of the gap controller 81 is fixed and assembled. To prevent external substances from entering the inner space between the base 70 and the moving plates 75, a covering plate 95 is installed keeping a certain distance with a special care not to interfere with the movement of the moving plates 75.

To prevent the moving plates 75 from bending due to the weight of a user, supporting blocks 73 are installed inside

each moving plate 75, where the supporting blocks are installed in a way that slide along the shaft 80.

The above embodiment (Figs. 1 to 6) were to illustrate the case where the seats are fixed on the moving plates. From such configuration, a shock absorbing can be accomplished only through the materials used for the seats. Therefore, this invention supplements the shock absorbance of the seats 90.

As illustrated in Fig. 7, the seat 90 and the moving plate 75 is hinged at under one end of the seat 90 and above one end of the moving plate 75 and shock absorbing means is installed.

In Fig. 7, leaf spring is used for the shock absorbing means and coil spring 93 is used in Fig. 8,

As the middle of the seat unit is lowered and absorbs the shock when a user sits on the chair and the seats 90 are adjusted to fit the pelvic and femoral region, the user can maintain more comfortable posture.

The pelvic angle is different for men 65′ and women 85′ as illustrated in Figs. 9A and 9B.

The pelvic angle can get wide due to improper posture, giving birth etc.

The larger pelvic angle causes the expansion of the pelvic gap. Since pelvis supports the weight of an upper body, the expansion of the pelvic gap leads to the increase of flesh around the bone and causes the corpulence of the lower body.

Therefore, this invention helps reducing the gap between

the pelvises or prevents the expansion of the gap by lowering the middle of the seats 90 as in Fig. 9C and corrects the pelvic shape.

While working, people tend to distort the upper body or incline to one side rather than maintaining the proper posture.

This invention changes the angle of the seats with the body movement and spreads the body weight evenly throughout the pelvis as illustrated in Figs. 7 and 8.

Industrial Applicability

As described in the above section, this invention divides the seats and allows their horizontal movements.

Such mechanism relieves the pressure on the anal region, provides a comfortable seating experience, makes the horizontal movement easy, and affords fresh environment through ventilation.

In addition, this invention can provide a fresh driving environment when applied on the automobile seats.

The shock absorbing function of the seat adjusts the angle of the seats for the pelvis and provides a user with comfortable working environment.

Although the preferred embodiment of the present invention have been disclosed for illustrative purposes, the present invention is not limited to the above-described embodiments. It is apparent to one who has an ordinary skill

in the art that there may be many modifications and variations within the same technical spirit of the invention.